***Trade and Industrial Education***
***Course: Electrical II***
**Course Code # 5734**
**2 Credits**

**School Year _____**

**Term:____Fall____Spring**

| | |
|---|---|
| Student: | Grade: |
| Teacher: | School: |
| Number of Competencies in Course: | **69** |
| Number of Competencies Mastered: | |
| Percent of Competencies Mastered: | |

## STANDARD 1.0: Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 1.1 | Demonstrate leadership skills. | | |
| 1.2 | Use problem-solving techniques to address and propose solutions to school, community, and workplace problems. | | |
| 1.3 | Demonstrate the ability to work professionally with others. | | |
| 1.4 | Participate in SkillsUSA-VICA as an integral part of instruction. | | |

## STANDARD 2.0: Students will assume responsibility for the safety of themselves, their coworkers, and bystanders.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 2.1 | Exhibit and encourage in others a positive attitude regarding safety practices and issues. | | |
| 2.2 | Habitually inspect and use appropriate personal protective equipment for assigned tasks. | | |
| 2.3 | Inspect, maintain, and employ safe operating procedures with tools and equipment, such as electrical test equipment, lifting equipment, powder actuated drivers, and high pressure gas containers. | | |
| 2.4 | Exhibit a well-developed awareness of potential hazards to themselves and others. | | |
| 2.5 | Carry out responsibilities under Hazard Communication (HazCom) regulations. | | |
| 2.6 | Take action to protect coworkers and bystanders from hazards as required by regulations, and company policies. | | |
| 2.7 | Report accidents and observed hazards, and execute emergency response procedures as required by regulations, and company policies. | | |
| 2.8 | Demonstrate appropriate related safety procedures. | | |
| 2.9 | Pass with 100 % accuracy a written examination relating to safety issues. | | |
| 2.10 | Pass with 100% accuracy a performance examination relating to safety. | | |
| 2.11 | Maintain a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor. | | |

## STANDARD 3.0: Students will interpret, lay out, and fabricate in conformance to construction drawings and written specifications.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 3.1 | Scale dimensions that are not explicitly included in construction drawings. | | |
| 3.2 | Interpret plan and elevation views shown in construction drawings. | | |
| 3.3 | Recognize and interpret lines and symbols commonly used in construction drawings. | | |

## STANDARD 4.0: Students will use safe practices when working with electrical systems.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 4.1 | Demonstrate the use of protective equipment and tools on high voltage systems (over 600 V), real or mock-up. | | |
| 4.2 | Evaluate the burn and blast hazards associated with large battery systems. | | |
| 4.3 | Research the environmental hazards associated with oil-filled transformers. | | |
| 4.4 | Pass with 100 % accuracy a written examination relating to safety issues. | | |
| 4.5 | Pass with 100% accuracy a performance examination relating to safety. | | |
| 4.6 | Maintain a portfolio record of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor. | | |

## STANDARD 5.0: Students will analyze and install over-current protective devices, such as fuses and circuit breakers.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 5.1 | Compare the characteristics and uses of fuses and circuit breakers. | | |
| 5.2 | Identify physical examples of fuses and circuit breakers. | | |
| 5.3 | Demonstrate the installation, wiring, testing, and operation of fuses and breakers in both single and polyphase circuits. | | |

## STANDARD 6.0: Students will select and install appropriate lighting fixtures for common applications.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 6.1 | Compare and contrast the characteristics of various types of electrical lights, such as incandescent, fluorescent, and high-intensity discharge. | | |
| 6.2 | Discuss the advantages of various types of electric lights, such as incandescent, fluorescent, and high-intensity discharge in particular applications. | | |
| 6.3 | Demonstrate correct installation and wiring of various types of electric lights, such as incandescent, fluorescent, and high-intensity discharge. | | |

## STANDARD 7.0: Students will calculate load and required conductor size and over-current protection for branch circuits.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 7.1 | Calculate loads for single-phase and three-phase branch circuits. | | |
| 7.2 | Size branch-circuit over-current protection devices and conductors for non-continuous and continuous-duty circuits. | | |
| 7.3 | Comprehend and apply derating to size branch circuits. | | |
| 7.4 | Locate over-current protection devices based on National Electrical Code (NEC) rules. | | |
| 7.5 | Calculate resistance of conductors. | | |
| 7.6 | Adjust conductor size to compensate for voltage drop. | | |
| 7.7 | Select conductors with properties appropriate to the application. | | |

## STANDARD 8.0: Students will analyze and properly employ over-current protection devices.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 8.1 | Distinguish between overload and short-circuit current. | | |
| 8.2 | Distinguish between current rating and interrupting capacity of a breaker or fuse. | | |
| 8.3 | Choose an over-current protection device or combination of devices adequate to protect circuit components. | | |

## STANDARD 9.0: Students will analyze, install, and troubleshoot lighting systems.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 9.1 | Distinguish between incandescent, fluorescent, and high-intensity discharge (HID) and describe how each operates. | | |
| 9.2 | Compare and contrast the advantages and disadvantages of incandescent, fluorescent, and HID lighting systems. | | |
| 9.3 | Install and wire incandescent, fluorescent, and HID lighting systems. | | |
| 9.4 | Troubleshoot fluorescent and HID lighting systems. | | |

## STANDARD 10.0: Students will install three-phase motors and control circuits.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 10.1 | Size, select, and install overload relays for electric motors. | | |
| 10.2 | Calculate and install devices to improve the power factor at motor locations. | | |
| 10.3 | Install dual-voltage three-phase motors. | | |

## STANDARD 11.0: Students will describe, install, and troubleshoot electrical circuits associated with heating, ventilation, and air conditioning (HVAC) equipment.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 11.1 | Compare the various types of heating systems used in residential and commercial applications. | | |
| 11.2 | Interpret electrical nameplate data on HVAC equipment. | | |
| 11.3 | Install electrical circuits and related components to HVAC equipment in accord with National Electrical Code (NEC). | | |
| 11.4 | Troubleshoot electrical components of HVAC systems. | | |

## STANDARD 12.0: Students will size raceways, boxes, and fittings based on fill and bend requirements.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 12.1 | Size and install raceways, pull boxes, outlet boxes, and junction boxes in accordance with National Electrical Code (NEC) requirements for conductor bend radius and raceway fill limitations. | | |
| 12.2 | Size and install raceways, pull boxes, outlet boxes, and junction boxes to facilitate practical conductor installation, splicing, and terminations. | | |

## STANDARD 13.0: Students will determine type and location of electrical switches and receptacles.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 13.1 | Determine type and location of electrical receptacles, as appropriate for use and required by National Electrical Code (NEC). | | |
| 13.2 | Determine type and location of electrical switches, as appropriate for use and required by NEC. | | |
| Note: | Installing of switches and receptacles has been covered in a previous course. The instructor may optionally choose to include some installation practice here. | | |

## STANDARD 14.0: Students will select, connect, and test distribution system transformers.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 14.1 | Describe basic transformer construction and operation. | | |
| 14.2 | Connect a multi-tap single-phase transformer for required secondary voltage(s). | | |
| 14.3 | Connect transformers in both star- and delta-configurations to provide low-voltage three-phase power. | | |
| 14.4 | Connect transformers to provide star to delta transformations. | | |
| 14.5 | Determine transformer sizes for various kVA loads. | | |
| 14.6 | Test transformers. | | |

## STANDARD 15.0: Students will analyze the theory of electric motors and install motors in accordance with industry requirements.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 15.1 | Select and identify a motor based on its intended use. | | |
| 15.2 | Determine the installation requirements to satisfy National Electrical Code (NEC) and OSHA regulations, given a motor and specified application. | | |
| 15.3 | Select, install, and wire DC, single-phase, and polyphase electric motors. | | |

## STANDARD 16.0: Students will construct and design motor control circuits.

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 16.1 | Construct motor control circuits for a single-phase motor. | | |
| 16.2 | Construct motor control circuits for a poly-phase motor. | | |
| 16.3 | Design motor control circuits for three-phase motors. | | |

## STANDARD 17.0: Students will assess hazardous locations and possible sources of ignition

| Learning Expectations | Check the appropriate Mastery or Non-Mastery column | Mastery | Non-Mastery |
|---|---|---|---|
| 17.1 | Assess hazardous locations. | | |
| 17.2 | Assess possible sources of ignition. | | |

Additional Comments _____